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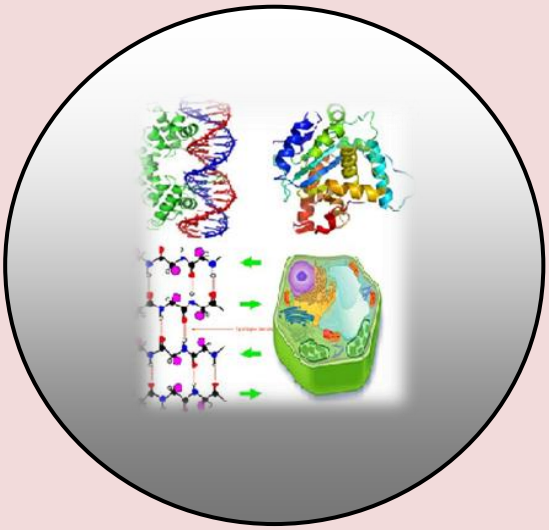

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RESEARCH PAPER

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Meat Quality of Spent Ducks Fed Fermented and Unfermented Papaya Leaf Meal in the Ration

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ABSTRACT

The research aims to know the influence of fermented and unfermented papaya leaf meal in rations on the quality of spent ducks meat has been implemented in Kediri-Tabanan for 3 months. The experimental design used was a completely randomized design (CRD) consisting of 3 treatments and 5 replicates, so there were 15 experimental units. Every unit using 3 heads of spent ducks. The treatments were: T0 (rations without papaya leaf, as a control), T1 (rations containing 5% unfermented papaya leaf meal) and T2 (rations contain 5% fermented papaya leaf meal). The variables observed were: physical meat quality (cooking loss, water holding capasity, and pH), chemical meat quality (moisture, protein, and fat content) and meat organoleptic. The results showed that fermented and unfermented papaya leaves meal no significantly effect (P>0.05) on pH value, moisture and colour of spent duck meat, but other variables were significant (P<0.05). Spent ducks meat fed unfermented papaya leaf meal has the higest cooking loss and the lowest water holding capacity value between the treatments. The granting of 5% fermented papaya leaf meal in the ration significantly improve protein content and reduce fat content of spent ducks meat. Fermented and unfermented papaya leaf meal has the same effect on organoleptic value of spent ducks meat. Based on the results of the study it can be concluded that spent ducks fed fermented papaya leaf meal have better meat quality than unfermented papaya leaf meal.
Keywords: Meat Quality, Spent Ducks and Papaya Leaf Meal.

INTRODUCTION

In Bali, ducks meat began to be enjoyed by the community, both local and foreign tourists. It can be show from the growing of dining serves that prepare some kinds menu of processed ducks meat, ex : betutu and fried ducks. The ducks meat that widely available in the market or in some dining serves are from young male ducks or female spent ducks. So, the physical meat quality not so good, ex : the texture coarse, tough, and a fishy odor. Suparno (2005), explain that the interesting consumer on meat depend on tenderness, colour, flavor and taste of meat.The ducks meat also contain much fat, so its not good for health. Fat could increase the blood colesterol and caused atherosclerosis, one kind of desease that makes people afraid in this period. One way to increase the quality of spent ducks meat is by using papaya leaf meal. Papaya leaves meal can be given to livestock in the form of fermentation or without fermentation.

The study about papaya leaf meal fermentation and without fermentation was done. Siti (2013) reported that papaya leaf meal without fermentation in the ration can soften and reduced meat fat of males Bali ducks age of 12 weeks. Papaya leaf contains papain, one kind of proteolitic enzyme that could decrease biosynthesis of colagen, so it can be tender the texture of meat.
Next, Sukmawati (2017) reported that fermented papaya leaf waste significantly reduced blood triglyceride and Low Dencity Lipoprotein (LDL) as well as increased the High Dencity Lipoprotein (HDL). LDL and HDL are a compound that belongs to the complex lipid that called lipoprotein. The function of LDL is carries cholesterol and phospholipids to various body tissues for the synthesis of cell membrane, while the HDL transports cholesterol from body tissue to liver. High levels of HDL are associated with resistance to atherosclerosis disease. Pangestu (2018), reported that fermented papaya leaf on the level of 5% and 10% in the ration can increase the value of the tenderness or the texture of females bali ducks meat, but no effect on colour, aroma, taste and overall acceptance. Based on the information, then this research was carried out to compare the meat quality of spent duck fed fermented and unfermented papaya leaf meal in the ration.

MATERIAL AND METHODS

Animal and Feed

Forty five spent ducks in homogen body weight (1,46 ± 0,12 kg) were used and allocated to 3 groups (treatments) in a completely randomized design. Every treatment consist of 5 replications and every replication used 3 heads of duck, so there were 15 experimental units. The treatments were : T0 (control, diet without papaya leaf meal), T1 (diet contain 5% unfermented papaya leaf meal) and T2 (diet contain 5% fermented papaya leaf meal). These animals were bought from ducks farming in Kelating, Tabanan, Bali, Indonesia. All ducks were given a basal diet composed of complit feed 144, corn brand, and pollard. Papaya leaf meal given only in treatments T1 and T2. The ingredient and chemical compositions of the diet are presented in Table 1.

Table 1. Ingredient and Chemical Composition of Diets Used in This Experiment.

Ingredient/nutrients	**Treatments**		
	T0	**T1**	**T2**
Complit feed 144 (%)	20	20	20
Corn brand (%)	40	40	40
Pollard (%)	40	35	35
Unfermented papaya leaf meal (%)	0	5	0
Fermented papaya leaf meal (%)	0	0	5
Total (%)	100	100	100
Nutrients			
Metabolism Energy (kkal/kg)	2,776	2,660	2,660
Crude Protein (%)	18.84	18.00	18.01
Eter Extract (%)	3.80	3.46	3.46
Crude Fiber (%)	5.16	4.84	4.84
Ca (%)	2.48	2.49	2.49
P (%)	0.73	0.67	0.67

Description

T0 : Ration without papaya leaf meal (control)
T1 : Ration contain 5% unfermented papaya leaf meal
T2 : Ration contain 5% fermented papaya leaf meal

Preparation of Fermented Papaya Leaf Meal

The papaya leaves used were old papaya leaf but it still green. The papaya leaf got from the farmer's papaya garden in Tabanan, Bali, Indonesia. Papaya leaf waste grind to be a meal, dried and weighting.

Dried papaya leaf meal was fermented by effective microorganism (*lactobacillus sp.*, *actynomycetes*, fotosynthetic bacteria and yeast) about 5% of material weight. Papaya leaf meal which have been mixed with microbe enter to plastic bag and closed, save for 3 days and ready to mixed with other material diets.

Variables Observed

a. Physical meat quality (pH value, moisture, *cooking loss*, and *water binding capacity*).

Determination of the pH of the fresh meat is done by using a pH meter (Soeparno, 2005). 10 g sample is crushed and diluted with 10 ml aquadest, then conducted measurements of pH calibration solution after a buffer (pH 4 and 7). The electrode being washed and dried is then inserted into the extract, after that the switch is turned on and the number listed is the pH of the meat extract.

Determination of water content of meat (%) by using proksimat analysis (AOAC, 1984). Empty bowls dioven at 105oC temperature for 30 minutes, then put in a desiccator for 10 minutes and weighed (g X). Subsequently incorporated into a cup of meat samples 5 g (Y g). The Cup that already contains a sample dioven at 105oC temperature during approximately 12 hours. Furthermore it is cooled in a desiccator for 15 minutes, then weighed (g Z). Moisture content is calculated by the formula:

$$\text{Water content (\%)} = \frac{\text{(initial weigt) – (final weight)}}{\text{Ititial weight}} \times 100\%$$

Cooking loss is determined by a modified method of Bouton et al. (1971) in Soeparno (1994). Sample ± 20 g weighed and put into a plastic bag clips, laboured so that water does not enter into the plastic. Further cooked in a water bath for 1 hour at a temperature 80^{o}C. After cooking the meat sample is cooled, the meat is removed from the bag, the liquid which attach tissue paper is dried and weighed.

$$\text{Cooking loss (\%)} = \frac{\text{weight before cooking – Weight after cooking}}{\text{Weight before cooking}} \times 100\%$$

Water holding capacity was determined based on the method of Hamm (1972) in Suparno (2005). 1.5-2.5 g of meat put in bowls and disentrifuge with a speed of 5000 rpm for 60 minutes. Next residue of meat weighed and water binding capacity can be calculated with the formula:

$$\text{Water Holding Capasity (\%)} = 100 - \frac{\text{Meat residu weight}}{\text{Sample weight}} \times 100\%$$

b. Chemical meat quality (protein and fat content).

The crude protein was determined by the Kjeldahl method the as described by AOAC (2005). Samples weighed as much as 0.1 to 0.5 g, inserted into the 100 mL Kjeldahl flask, then dexstruction (warming up in a State of boil) until the solution becomes clear and green SO_2 is lost. The solution allowed to cool, and transferred to the flask 50 mL and diluted with akuades until the sign tera, inserted into a tool of distillation, added with 5-10 mL 30-33% NaOH and distillation. Destilat accommodated in solution 10 ml boric acid 3% and a few drops of indicator (bromcresol green solution 0.1% methyl red solution and 29 0.1% in alcohol 95% separately and mixed between 10 mL bromcresol green with 2 mL of methyl red) then titrated with a solution of HCl solution 0.02 N to change its color to red. Protein levels are calculated by the formula:

$$\text{\% protein} = \frac{\text{(VA – VB) HCl x N HCl x 14.007 x 100}}{\text{W x 1000}}$$

VA : mL of HCl to titrate the sample

VB : mL HCl totitrate the blangko

: normality of HCl standard used

14,007 : the weight of Nitrogen atom

W : the weight of the sample in grams

Protein is expressed in units of g/100 g of sample (%).

Analysis of fat content is done by Soxhlet methods (AOAC, 2005), which is the fat that is contained in the sample is extracted using a solvent polar non-fat. Procedure analysis of fat content as follows: fat pumpkin to be used bake in an oven for 15 minutes at a temperature of 105 ° C, then cooled in a desiccator to remove water vapor during 15 minutes and weighed (A). Samples weighed as much as 5 g (B) then wrapped with paper wrapped, covered with fat-free cotton and put in a Soxhlet extraction tool that has been linked with a fat pumpkin has been known and oven does it weigh. Heksan solvent is poured until it submerged samples and conducted reflux or ektraksi fat during 5-6 hours or until the solvent fat down to fat pumpkin-colored waters. The fat has been used solvent, refined and accommodated after it extracts fat that exists in the fat dried pumpkin in the oven-temperature 100-105 ° C for 10 minutes, then cooled in a desiccator fat Pumpkins for 15 minutes and weighed (C). Stages of drying pumpkin fat repeated until a constant weight was obtained. Fat content calculated by the formula:

$$\% \text{ total fat} = \frac{C - A}{B} \times 100\%$$

Note :

A: The weight of the empty round bottom flask (g)
B: The sample weight (g)
C: The weight of the round bottom flask and fat extraction results (g)
D:

c. Meat Organoleptic (colour, aroma, texture, taste and overall acceptance)

Organoleptic test done according to Rabka (2011) by determine the level of fondness (hendonik) as the description chosen by panelists. The description of the results are transformed into numerical values for statistical analysis. Assessment of the numbers 1-5 indicating the value (score) in the following order: 1 (really dislike), 2 (dislike), 3 (regular), 4 (like), and 5 (really like).

Data Analysis

Data obtained from the results of the research were analyzed by Analysis of Variance. If there is significantly response among the treatments, it will be continued to Duncan Multiple Rang Test on the level of 5% (Steel and Torrie, 1986).

RESULTS

Data the effect of fermented and unfermented papaya leaf meal in the ration on meat quality of spent ducks are represented in Table 2. The data show that fermented and unfermented papaya leaf meal not significantly affect ($P<0.05$) on pH value, moisture and meat colour of spent ducks meat, but other variable were significant ($P<0.05$). Although the pH value, moisture and meat colour not significantly affect but the pH value and moisture in treatment T1 and T2 were inclined lower than the control (T0). The skor of meat colour in treatment T1 and T2 were inclined higher than the control.

The pH value of spent ducks meat on treatment T0 (control) was 5.91 (Table 2). PH value of the spent ducks meat fed unfermented papaya leaf meal (T1) and fermented papaya leaf meal (T2) each of 3.55% and 3.21% lower than the control, but statistically not significant different ($P>0.05$). The pH value of the spent ducks meat fed fermented papaya leaf meal (T2) 0.35% not significantly ($P > 0.05$) higher than that unfermented (T1). The granting of 5% unfermented papaya leaf meal in the ration (T1) significantly ($P<0.05$) increased cooking loss (3.44%) and decreased water binding capacity (8.63%) of spent ducks meat, but fermented papaya leaf meal (T2) the same as the control (T0).

The chemical meat quality of spent ducks fed fermented (T2) and unfermented papaya leaf meal (T1) show better quality than the control (T0). Fermented and unfermented papaya leaf meal in the ration could increased protein content (2.64% and 3.76% respectively) and decreased fat content of meat (7.76% and 14.94% respectively), but unfermented papaya leaf meal has no significantly effect compared with the control ($P>0.05$).

The spent ducks consumed 5% fermented and unfermented papaya leaf meal have organoleptic value significantly higher than the control (more like), except meat colour was no significant effect ($P>0.05$). Spent duck meat fed fermented papaya leaf meal has meat colour, aroma and texture better than unfermented papaya leaf meal, but has taste and overall acceptance tend to be lower than unfermented papaya leaf meal (Tabel 2).

Table 2. The effect of fermented and unfermented papaya leaf meal in the ration on meat quality of spent duck.

Variable	Treatment[1)]			SEM[2)]
	T0	T1	T2	
Physical meat quality:				
pH	5.91[a]	5.70[a]	5.72[a]	0.06
Cooking loss (%)	38.12[a]	39.43[b]	38.35[a]	0.42
Water holding capacity (%)	32.46[b]	29.66[a]	31.60[b3)]	0.41
Chemical meat quality :				
Moisture (%)	73.50[a]	72.79[a]	73.34[a]	0.48
Protein content (%)	34.04 [a]	34.43 [ab]	35.37 [b]	0.51
Fat content (%)	1.74 [b]	1.61 [ab]	1.48 [a]	0.11
Meat organoleptic :				
Colour	3.05[a]	3.40[a]	3.50[a]	0.22
Aroma	3.00[a]	3.25[ab]	3.40[b]	0.18
Texture	2.65[a]	3.30[b]	3.35[b]	0.20
Taste	3.05[a]	3.80[b]	3.50[b]	0.19
Overall acceptance	3.05[a]	3.80[b]	3.55[b]	0.16

Description:

1) T0 : Ration without papaya leafs meal (control)
   T1 : Ration contain 5% unfermented papaya leaf meal
   T2 : Ration contain 5% fermented papaya leaf meal
2) SEM : *Standard Error of The Treatment Means*
3) Values followed by different superscript in the same row were significantly (P<0,05)

DISCUSSION

The pH value of spent duck meat fed unfermented (T1) and fermented papaya leaf meal (T2) not significantly affect (P>0.05) between all the treatment, but its tenden to be lower than the control amounting to 3.55% and 3.21% respectively. The pH values were ranged from 5.70-5.91. This value is still in normal range because according to Nurwantoro (2003), the normal pH of ducks meat is 5.4-5.8. It further mentioned that the meat pH was influence by species, individuals, kinds of muscles, enzyme activity, and glycolysis. Prissa (2014) reported that the care system also affect on the ducks meat pH. Cage system was produces duck meat pH lower (6,29-6.49) than duck meat pH in shepherd (6,47-6,65). The granting of papaya leaf meal caused decrease the pH of spent ducks meat although it was not significant. This shows that the duck meats fed papaya leaf meal are more durable than any who do not consume the papaya leaves.

The granting of unfermented papaya leaf meal in the ration (T1) significantly decreased water binding capacity (WBC) and increased cooking loss of spent ducks meat. Fermented papaya leaf meal (T2) has the same effect, but not significantly compare with the control. This was caused by the presence of the papain enzyme in unfermented papaya leaf meal which causes the meat more tender so the water binding capacity was lower that caused the cooking loss could be higher. The treatment of fermentation caused the papain enzyme content being reduced, so that its effects on the meat tender is also reduced and this has an impact on the cooking loss value. The cooking loss value of spent duck meat on this study (38.12-39.43) were higher than that obtained by Prissa (2014) that reported the cooking loss of spent ducks meat at different locations was amounted to 31.69%. According to Soeparno (1998), the value of meat cooking loss were range between 1.5%-54.5%, so the value of meat cooking loss on this research is still in the normal range.

Cooking loss value has a negative correlation with water binding capacity. Water binding capacity is the ability of meat to hold the water contained in the tissues. High or low the value of water binding capacity would effect on the colour, tendernes, suppleness, the impression of the juice and the texture of the meat.

The highest value of water binding capacity was at the treatment T0 (32.46%), followed by T2 (31.60%) and T1 (28.66%). Granting of papaya leaves meal without fermentation (T1) as much as 5% causing a decrease the water binding capacity amounted to 11.71% whereas the fermented (T2) has no effect. This is caused by papain enzyme activity that causes the meat more tender so that the water binding capacity is lower. On the fermented papaya leaf meal, enzymes papain likely has been inactive so that its ability to soften the meat becomes reduced.

The chemical qualities of spent duck meat on this study were measured by moisture, protein, and fat content. The granting of papaya leaf meal without fermentation (T1) and fermentation (T2) as much as 5% causing an increase in water content of meat each of 0.70% and 0.50% compared with the control (T0), but statistically not significant different ($P > 0.05$). The results of this study in accordance with Siti (2013), that the granting of papaya leaves meal without fermentation as much as 2-6% in the ration is not significantly ($P > 0.05$) increase the water content of males bali ducks meat age 8 weeks. Next the Siti (2015) reported that the granting of fermented papaya leaf extract as much as 12%-16% in ration significantly ($P < 0.05$) increase the water content of chicken meat 12 weeks of age.

Spent ducks meat that consume fermented papaya leaf meal without fermentation as much as 5% (T1) have a protein levels tend to be higher (2.64%) and fat content lower (7.76%) compared with the control (T0), but statistically not significant different ($P > 0.05$). The spent ducks fed fermented papaya leaf meal (T2) has meat protein content 3.76% significantly higher and fat content 14.94% significantly lower than the control.

The granting of papaya leaf meal without fermentation (T1) and fermentation (T2) generally provide significantly effect on the value of spent ducks meat organoleptic, except for the meat colour. Although the meat colour does not significantly different ($P > 0.05$), but its score tends to be higher than the control (T0) and fermented papaya leaf meal has a higher score than without fermentation (3.40 vs 3.50). This means that papaya leaf without fermentation and fermentation cause the color of the meat becomes more interesting because it looks brighter. This result is in accordance with obtained Siti (2013) that giving papaya leaf meal without fermentation as much as 2-4% can increase color score of ducks meat aged 12 weeks. Next, Pangestu (2018) reported that giving fermented papaya leaf meal not significantly increased the colour skor of ducks meat 10 weeks of aged.

Panelists valuations on the aroma of spent ducks meat indicates that spent ducks fed fermented papaya leaf has score 13.33% significantly higher than controls. Spent ducks meat fed fermented papaya leaf meal also has a higher score than the controls, but statistically not significant different. This reflects that the fermented papaya leaf can produce a more savory meat aroma than without fermentation and without papaya leaf.

The granting of fermented and unfermented papaya leaf meal can improve the texture of spent ducks meat significantly compared with the controls, but fermented papaya leaf meal has score tends to be higher. This is caused by the papain enzyme in papaya leaf which causes the meat to become tender. Based on the flavor of the spent ducks meat, show that the spent duct fed unfermented and fermentated papaya leaf meal have significantly better taste than any who do not consume the papaya leaf meal becaus papaya leaf can reduce the fishy odor of meat . However, from the results of this research show that the skor of spent meat fed fermented papaya leaf meal lower than unfermented, but not significant different. This shows that the spent ducks meat fed papaya leaf without fermentation more savory than fermented. An overall admission also shows the same results with flavor.

CONCLUSION

Based on the results of this study it can be concluded that spent duck consumed fermented papaya leaf meal has betther physical meat quality than unfermented papaya leaf meal. Fermented and unfermented papaya leaf meal have the same potential to improve chemical and organoleptic value of spent ducks meat, but fermented papaya leaf meal tend be better than without fermentation.

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